WHAT IS CLAIMED IS:

1. A crystal of rifampicin bound to a core RNA polymerase (Rif-RNAP) that effectively diffracts X-rays for the determination of the atomic coordinates to a resolution of better than 3.5 Angstroms.

2. The crystal of Claim 1, wherein the core RNA polymerase is a bacterial core RNA polymerase.

3. The crystal of Claim 2, wherein the bacterial core RNA polymerase is a thermophilic bacterial core RNA polymerase.

4. The crystal of Claim 3, wherein the thermophilic bacterial core RNA polymerase is a *Thermus aquaticus* bacterial core RNA polymerase.

5. The crystal of Claim 1, wherein the core RNA polymerase comprises a β' subunit, a β subunit, and a pair of α subunits.

6. The crystal of Claim 5, further comprising an ω subunit.

7. The crystal of Claim 1 that effectively diffracts X-rays for the determination of the atomic coordinates of the core RNA polymerase to a resolution of 3.3 Angstroms or better.

8. The crystal of Claim 7 having space group of $P4_12_12$ and a unit cell of dimensions of a= b=201 and c= 294 Å.

9. A method of identifying an agent for use as an inhibitor of bacterial RNA polymerase comprising:

(a) obtaining a set of atomic coordinates defining the three-dimensional structure of rifampicin bound to the core RNA polymerase (Rif-RNAP); wherein said

core RNAP consists essentially of the β', β, α and ω subunits of RNAP from *T. aquaticus* and using a crystal having the space group of $P4_12_12$ and unit cell dimensions of a= b=201 and c= 294 Å;

(b) selecting a potential agent by performing rational drug design with the atomic coordinates obtained in step (a), wherein said selecting is performed in conjunction with computer modeling;

(c) contacting the potential agent with a bacterial RNA polymerase; and

(d) measuring the activity of the bacterial RNA polymerase; wherein a potential agent is identified as an agent that inhibits bacterial RNA polymerase when there is a decrease in the activity of the bacterial RNA polymerase in the presence of the agent relative to in its absence.

10. The method of Claim 9, further comprising:

(e) preparing a supplemental crystal containing the core RNA polymerase formed in the presence of the potential agent, wherein the crystal effectively diffracts X-rays for the determination of the atomic coordinates to a resolution of better than 5.0 Angstroms;

(f) determining the three-dimensional coordinates of the supplemental crystal with molecular replacement analysis; and

(g) selecting a second generation agent by performing rational drug design with the three-dimensional coordinates determined for the supplemental crystal, wherein said selecting is performed in conjunction with computer modeling.

11. The method of Claim 10, further comprising:

(h) contacting the second generation agent with a eukaryotic RNA polymerase; and

(i) measuring the activity of the eukaryotic RNA polymerase; wherein an agent is identified as an agent for use as an inhibitor of bacterial RNA polymerase when there is no change in the activity of the eukaryotic RNA polymerase in the presence of the agent relative to in its absence; and wherein the agent identified inhibits bacterial but not eukaryotic RNA polymerase.

12. A method of identifying an agent that inhibits bacterial growth comprising:

(a) obtaining a set of atomic coordinates defining the three-dimensional structure of rifampicin bound to core RNA polymerase (Rif-RNAP); wherein the core RNA polymerase consists essentially of the β', β, α and ω subunits of RNAP from *T. aquaticus* and using a crystal having the space group of $P4_12_12$ and unit cell dimensions of a= b=201 and c= 294 Å;

(b) selecting a potential agent by performing rational drug design with the atomic coordinates obtained in step (a), wherein said selecting is performed in conjunction with computer modeling;

(c) contacting the potential agent with a bacterial culture; and

(d) measuring the growth of the bacterial culture under conditions in which the bacterial culture grows in the absence of the agent; wherein a potential agent is identified as an agent that inhibits bacterial growth when there is a decrease in the growth of the bacterial culture in the presence of the agent relative to in its absence.

13. The method of Claim 12, further comprising:

(e) preparing a supplemental crystal containing the core RNA polymerase formed in the presence of the potential agent, wherein the crystal effectively diffracts X-rays for the determination of the atomic coordinates to a resolution of better than 5.0 Angstroms;

(f) determining the three-dimensional coordinates of the supplemental crystal with molecular replacement analysis; and

(g) selecting a second generation agent by performing rational drug design with the three-dimensional coordinates determined for the supplemental crystal, wherein said selecting is performed in conjunction with computer modeling.

14. The method of Claim 13, further comprising:

(h) contacting the second generation agent with a eukaryotic cell; and

(i) measuring the amount of proliferation of the eukaryotic cell under conditions in which the eukaryotic cell proliferates in the absence of the agent; wherein an agent is identified as an agent for inhibiting bacterial growth when there is no change in the proliferation of the eukaryotic cell in the presence of the agent relative to in its absence; and wherein the agent identified inhibits bacterial growth but not eukaryotic proliferation.

15. A method of identifying an agent for use as an inhibitor of bacterial RNA polymerase comprising:

(a) selecting a potential agent by performing rational drug design with the set of atomic coordinates in Table 2, wherein said selecting is performed in conjunction with computer modeling;

(b) contacting the potential agent with a bacterial RNA polymerase; and

(c) measuring the activity of the bacterial RNA polymerase; wherein a potential agent is identified as an agent that inhibits bacterial RNA polymerase when there is a decrease in the activity of the bacterial RNA polymerase in the presence of the agent relative to in its absence.

16. The method of Claim 15, further comprising:

(d) preparing a crystal containing a bacterial RNA polymerase formed in the presence of the potential agent, wherein the crystal effectively diffracts X-rays for the determination of the atomic coordinates to a resolution of better than 5.0 Angstroms;

(e) determining the three-dimensional coordinates of the crystal with molecular replacement analysis; and

(f) selecting a second generation agent by performing rational drug design with the three-dimensional coordinates determined for the crystal, wherein said selecting is performed in conjunction with computer modeling.

17. The method of Claim 16, further comprising:

(g) contacting the second generation agent with a eukaryotic RNA polymerase; and

(h) measuring the activity of the eukaryotic RNA polymerase; wherein an agent is identified as an agent for use as an inhibitor of bacterial RNA polymerase when there is no change in the activity of the eukaryotic RNA polymerase in the presence of the agent relative to in its absence; and wherein the agent identified inhibits bacterial but not eukaryotic RNA polymerase.

18. A method of identifying an agent that inhibits bacterial growth comprising:

(a) selecting a potential agent by performing rational drug design with the set of atomic coordinates in Table 2, wherein said selecting is performed in conjunction with computer modeling;

(b) contacting the potential agent with a bacterial culture; and

(c) measuring the growth of the bacterial culture under conditions in which the bacterial culture grows in the absence of the agent; wherein a potential agent is identified as an agent that inhibits bacterial growth when there is a decrease in the growth of the bacterial culture in the presence of the agent relative to in its absence.

19. The method of Claim 18 further comprising:

(d) preparing a crystal containing a bacterial RNA polymerase formed in the presence of the potential agent, wherein the crystal effectively diffracts X-rays for the determination of the atomic coordinates to a resolution of better than 5.0 Angstroms;

(e) determining the three-dimensional coordinates of the crystal with molecular replacement analysis; and

(f) selecting a second generation agent by performing rational drug design with the three-dimensional coordinates determined for the crystal, wherein said selecting is performed in conjunction with computer modeling.

20. The method of Claim 19, further comprising:

(g) contacting the second generation agent with a eukaryotic cell; and

(h) measuring the amount of proliferation of the eukaryotic cell under conditions in which the eukaryotic cell proliferates in the absence of the agent; wherein an agent is identified as an agent for inhibiting bacterial growth when there is no change in the proliferation of the eukaryotic cell in the presence of the agent relative to in its absence; and wherein the agent identified inhibits bacterial growth but not eukaryotic proliferation.

21. A method of obtaining a crystal of an inhibitor bound to a core bacterial RNA polymerase comprising

(a) growing the core bacterial RNA polymerase crystal in a buffered solution containing 40-45% saturated ammonium sulfate, wherein a crystal forms; and

(b) soaking the crystal in 2 M $(NH_4)_2SO_4$, with the inhibitor; where a crystal of the inhibitor bound to the core bacterial RNA polymerase is formed.

22. The method of Claim 21 wherein the inhibitor is rifampicin.

23. The method of Claim 21 wherein said growing is performed by a method selected from the group consisting of batch crystallization, vapor diffusion, and microdialysis.

24. (Twice Amended) A method of identifying a compound that is predicted to inhibit bacterial RNA polymerase comprising:

(a) defining the structure of rifampicin bound to the core RNA polymerase (Rif-RNAP) or a portion of the Rif-RNAP by the atomic coordinates in Table 2; wherein the portion of the Rif-RNAP comprises sufficient structural information to perform step (b); and

(b) identifying a compound that is predicted to inhibit bacterial RNA polymerase; wherein said identifying is performed using the structure defined in step (a).

25. The method of Claim 24, further comprising:

(c) contacting the compound with a bacterial RNA polymerase; and

(d) measuring the activity of the bacterial RNA polymerase; wherein the compound is identified as an agent that inhibits bacterial RNA polymerase when there is a decrease in the activity of the bacterial RNA polymerase in the presence of the compound relative to in its absence.

26. (Amended) The method of Claim 25, further comprising:

(e) contacting the compound with a eukaryotic RNA polymerase; and

(f) measuring the activity of the eukaryotic RNA polymerase; wherein the compound is identified as an agent for use as an inhibitor of bacterial RNA polymerase when there is no change in the activity of the eukaryotic RNA polymerase in the presence of the compound relative to in its absence; and wherein the compound identified inhibits bacterial but not eukaryotic RNA polymerase.

27. (Amended) A method of identifying a compound that is predicted to inhibit bacterial growth comprising:

(a) defining the structure of rifampicin bound to the core RNA polymerase (Rif-RNAP) or a portion of the Rif-RNAP by the atomic coordinates in Table 2; wherein the portion of the Rif-RNAP comprises sufficient structural information to perform step (b); and

(b) identifying a compound that is predicted to inhibit bacterial growth; wherein said identifying is performed using the structure defined in step (a).

28. The method of Claim 27, further comprising:

(c) contacting the compound with a bacterial culture; and

(d) measuring the growth of the bacterial culture under conditions in which the bacterial culture grows in the absence of the compound; wherein the compound is identified as an agent that inhibits bacterial growth when there is a decrease in the growth of the bacterial culture in the presence of the compound relative to in its absence.

29. (Amended) The method of Claim 28, further comprising:

(e) contacting the compound with a eukaryotic cell; and

(f) measuring the amount of proliferation of the eukaryotic cell under conditions in which the eukaryotic cell proliferates in the absence of the compound; wherein the compound is identified as an agent for inhibiting bacterial growth when there is no change in the proliferation of the eukaryotic cell in the presence of the compound relative to in its absence; and wherein the compound identified inhibits bacterial growth but not eukaryotic proliferation.

30. A computer having within its memory a representation of rifampicin bound to the core RNA polymerase (Rif-RNAP) or a portion of the Rif-RNAP comprising:

(a) a machine-readable data storage medium comprising a data storage material encoded with machine-readable data, wherein said data comprises structural coordinates from Table 2;

(b) a working memory for storing instructions for processing said machine-readable data;

(c) a central processing unit coupled to said working memory and to said machine-readable data storage medium for processing said machine readable data into a three-dimensional representation of the Rif-RNAP complex or a portion of the Rif-RNAP; and

(d) a display coupled to said central-processing unit for displaying said three-dimensional representation.